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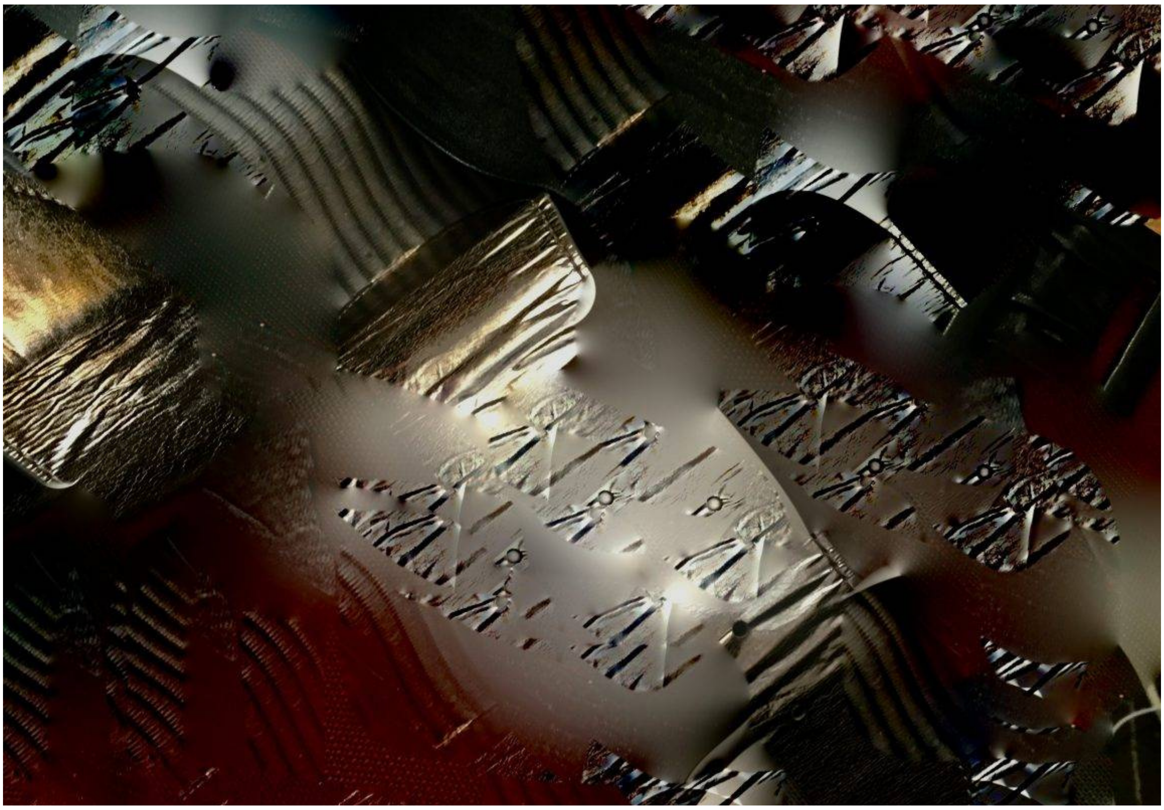

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QUANT-THEORY – MATERIALISM, PHILOSOPHY AND QUANTUM SCIENCE

GENERICSCIENCE MATERIALISM, MATTER, QUANT, QUANTUM PHYSICS, SCIENCE

Exzerpt from the forthcoming book: "Quant-Theory – Materialism, Philosophy and Quantum Science"

The first reaction of the inventors of quantum physics to the strange results that emerged from their equations (timelessness and spacelessness in the reference universe, non-locality of particles, dissolution of the identity principle, etc.) was, at least according to Baudrillard, to regard the microscopic world as radically alien. Understanding quantum theory as a new form of wholeness in physics, to which relations and possibilities can be ascribed as essential characteristics, seemed at first glance to be quite absurd. Baudrillard, on the other hand,

proposes to accept the microscopic world as it is represented by quantum theory, whereby the strangeness for him lies not in the strangeness of the microscopic world, but in the non-strangeness of the macroscopic world. Baudrillard asks why it is not strange that one readily assumes that the concepts of identity, the excluded middle, the determination of time and space are effective in the macroscopic world. (Baudrillard 1996: 29) But has it not long been the case, to argue here with and against Baudrillard, that quantum theory is responsible for physical realities of any size scale, as the physicist Palomaki recently proved, for example, when he showed that a quantum field and a classical oscillator can be entangled, which means nothing other than that classical actual realities of mechanics are entangled with quantum potential realities. (Palo-maki: 2013) The quantum physicist Diederik Aerts also comes to the conclusion that quantum entanglement can exist not only in the micro range, but also in the classical macro range (Aerts 2014) Entanglement states in general terms that the overall state of a composite system cannot be determined by the states of its subsystems. The whole is not the sum of its parts. More specifically, entanglement means that two elements can be directly coupled to each other in such a way that one property of the two parts is no longer determined independently of the other particle. As soon as a property of one element is determined by a measurement, the coupled property becomes apparent in the other. However, entanglement does not only occur when two particles originate from a common source, have interacted directly with each other or are connected due to a physical conservation law. Rather, it is sufficient for one of two entangled particle pairs – A and B / C and D – to interact with the other under experimental conditions in order for the other two to become entangled with each other. So if A and C are entangled, B and D are also entangled, even though these two particles have never directly met. (Vogd 2020: 194) The relationship between the two particles is therefore determined, but not the individual properties of the individual particles.

The Nobel Prize winner Anton Zeilinger and his colleagues succeeded in preparing quantum systems of light with an extension of 100 km in such a way that measurements could be carried out on them. Such a system originally consists of two photons and forms a uniform whole, a diphoton, which expands. (Görnitz/Görnitz 2016: 412) Take two photon sources. The polarization of one photon is measured and a further measurement is used to decide whether the two remaining photons are entangled or mixed. This is not determined in advance. If I now decide through the experimental setup to ask the photons: Are you entangled? Then I get the answer: Yes, we are also in an entangled state at the same time. If I decide through the experimental setup to ask: Are you mixed? Then I get the answer: Yes, I am mixed. I am not entangled. It becomes particularly exciting when the first measurement is carried out before the time at which it is decided whether the two sibling photons are entangled. You then get data sets of which it is initially impossible to say whether there is entanglement or a mixture. At the detectors you get random sequences consisting of ones or zeros. Only when this second measurement is made can a correlation be seen or not – namely when the two data sequences are compared. Only then can it be determined whether the data taken together prove the entanglement of the photons in the sense of a perfect correlation. Vogd 2020: 72)

Quantum phenomena are therefore everywhere. The unsolved problem is therefore not the quantum world, but the world of classical physics. Although it has proven itself in most practical cases, it is ultimately an idealization that is only approximately correct, and perhaps,

in a sense twisted with Baudrillard, only an illusion. We must therefore turn the problem around again. Quantum theory is more general; it applies not only to the microscopic world, but also to the macroscopic world and cosmology. Peter Mittelstadt comes to the conclusion that

the previous ontology of classical physics is in question, insofar as it offers idealizations for its world that have proven themselves in practice, but which could prove to be only approximately correct idealizations, i.e. ultimately based on illusions (Mittelstaedt 2000: 68)

The physicist John von Neumann already assumed in 1939 that the intersection between micro- and macrosystems can only occur arbitrarily, which means that the latter can also end up in quantum superpositions, and this includes the scientists' measuring devices, their bodies and their brains. The measuring apparatus is now itself understood as a quantum-theoretically describable system, whereby the measurement problem is regarded as an infinite process of interrelated measurements. For von Neumann, the only solution is an arbitrary cut that causes the wave function to collapse.

We have to go one step further than Baudrillard and must then concede a cosmological dimension to quantum theory with the quantum physicist Thomas Görnitz or even with Laruelle. Görnitz writes: "From the beginning of the universe, the fundamental substance proves to be a quantum structure. Protyposis is, ontologically speaking, still 'before' all the different 'types' of phenomena. It has the potential to come into 'form', to shape itself, to 'become forms'. Protyposis is therefore essentially an information structure that is initially free of meaning. In relation to the living, it can become something meaningful" (ibid.: 23). The universe as a whole has a constantly undetermined quantum state, a non-collapsing wave function, i.e. it is not a closed system. It follows from the concept of the universe that it has neither an external measure of time nor an external measure of space. There is therefore neither a space around it into which it could expand, nor a time in which it could unwind. Rather, it generates both from within itself, through internal fractal, quantum and multidimensional entanglement, whereby even the observer is an ensemble of the universe. Niklas Luhmann's systems theory added that the observer does not have to be a subject with consciousness, but can be defined purely formally, namely as a system of meaning that makes numerous distinctions and designations in the course of concatenating observations. Observation (type of operation) is thus a process by means of which distinctions are made and at the same time designated and through which intersections are created that point to what connects them. For quantum theory, the observer remains a paradox insofar as, according to Bohr, the reality of an object is initially determined by the act of observation. Otherwise, it exists in the formlessness of a probable field or in the superposition in which a particle can be in an arbitrary number of discrete positions simultaneously. This superposition is not observable; however, a singular discrete position can be produced by a collapse, making observation as form production possible. The superposition is not a physical object.

The meso-world is therefore not only confronted with the infinitely small (incidentally, one will never find the last small particles; quantum theory is not about the small, but about the exact and the indeterminate), but also the universe as an infinitely large entity. Just as the microscopic "unconscious" manifests itself in the world, the large macroscopic "unconscious" also manifests itself in the world. The latter through a series of symptoms, which are the stars

and galaxies in the universe. This duality of infinities breaks the unity of the unconscious that surrounds the world. Laruelle writes that one should not replace the “will to power” with the will to science, but with the “will” to be overdetermined by the indifferent and black universe. (Laruelle 2019) But even our meso-world is already global (and planetary): Ba-taille’s general economy, for example, derives its conditions and results from the necessity of global configurations. Quantum mechanics also implies very complex relationships between local and global economies. Some of these complexities are already evident in the earliest formulations of quantum mechanics. (Cf. Plotnitsky 1994)

For Baudrillard, it is not the question posed by Leibniz as to why “something” is and not “nothing” that is decisive, but the question as to why “nothing” is first and then “something”. (Baudrillard 1996: 12) But there is no “something”. There is only “nothing”. And yet this nothingness cannot be thought of in isolation from the processes through which it can give the appearance of existing – processes that it generates, namely through negativity. At this point, Baudrillard is close to Derrida’s deconstructivism. According to Derrida, absolute nothingness – différance – requires the simulacrum of a presence that permanently shifts itself, while its resulting loss is simultaneously preserved and seen in the form of presence. In order for nothingness to be so absolute, it must unfold between, during and through an infinite series of different differences, delays and recursions, constantly feigning or simulating being or meaning without ever actually delivering it. In this way, the absolute nothing distinguishes itself from itself and shifts itself. Thus, absolute nothingness produces the differential simulacra of a being in constant delay and guarantees that nothingness is absolutely not what it is, since it itself is not allowed to be. Derrida’s constitutively impure conception of absolute nothingness, différance, denotes an aporia of reciprocal negativity between nothingness and being, so that both are absent in relation to themselves in a way that is completely devoid of positive terms and absolutely excludes any possibility of self-presence. As ab-solute absence, différance designates an aporetic nothingness that is both possible (nothing, meaningless) and impossible (something, meaningful), since it is not what it is and thus necessarily entails – or generates – its own self-negation in the form of differential simulacra.

In quantum field theory, the term vacuum state is associated with a field of virtual particle-antiparticle pairs that appear and disappear again before the conservation of energy is violated. According to quantum field theory, the vacuum state is definitely a type of energy/matter. Despite the absence of real particles, it is dynamic and can hardly be understood as an attribute of nothingness. Therefore, the vacuum state ensures the possibility of finding something even when there is nothing. In quantum field theory, nothingness is by no means empty, but an infinite fullness, a dynamic of iterative opening that cannot be separated from matter. The vacuum is infinitely full of the virtuality of everything that ever was, what is and what ever will be. Deleuze has adopted this idea in his concept of virtuality. He defines the virtual as that which was possible at a given place and at a given time in the past, is possible now or will be possible in the future. The vacuum is a field of pure, unexcited energy and is therefore called a vacuum because it has no recognizable properties or characteristics. Only when the zero-point field of the vacuum is left do things emerge that have properties or characteristics. The quantum vacuum can be imagined as a calm sea that underlies all existing things, which are patterns of dynamic energy written on the quantum vacuum.

For quantum physicist Karen Barad, reality is one of the entangled phenomena that always obey quantum laws. (Barad 2007: 118 ff.) Each phenomenon comprises its own past and future, which are then created as times as soon as the coordinates of a phenomenon are fixed by an acting cut in physical measurement qua material discursive apparatuses. The term "phenomenon" in Barad, who cites Niels Bohr as a reference at this point, refers to registered observations or measurements, i.e. only to what has already happened and not to what could happen, even if the latter possibility corresponds to a strict prediction, which is made possible by quantum mechanics, but can only be probabilistic and therefore never guarantee a complete result. (For probabilistic thinking, the total number of possible cases, the total range of possible outcomes, each with its determinable probability of occurrence, must be finite and countable. This applies to negentropic as well as entropic processes, whereby negentropy accordingly quantifies and makes countable the symmetrical negative of what the term "entropy" quantifies and makes countable). An act of observation produces quantum phenomena through an interaction between the instrument and the quantum object, and at the time of measurement, quantum objects as applicable idealizations. As far as the generation of the observed information is concerned, a quantum measurement is a number or bit generator (quantum computer). In the case of quantum phenomena, Plotnitsky sees a technical difference between an observation that constructs a phenomenon and a measurement that measures the physical properties of this phenomenon. (Plotnitsky 2021) There is the constitution of reality that is responsible for quantum phenomena, quantum objects (idealizations at the time of measurement), measuring instruments and quantum phenomena (defined by what is observed in measuring instruments). Measuring instruments have an unobservable quantum layer that enables interaction with the part of this layer that is assumed to exist independently, without being able to represent it, as would be the case in a realistic understanding. Consequently, for Plotnitsky, quantum phenomena are irreducibly different from quantum objects, although they can represent classical objects associated with measuring instruments. Phenomena involve both the description of an experimental arrangement and the observed results. Each phenomenon entails a specific difference, a cut that juxtaposes an agent and an object in the measuring process, which cannot be organized without apparatus. (Barad 2007: 118 ff.) The cut between the object and the observation or measuring device is arbitrary in principle, although in practice it depends on the technologies of the experiment. The cut can be continued ad infinitum either between the original object and the instrument or between the assembled object and another instrument. The intraactions between the inside and the outside lead to a changing complementarity, which is the core of Bohr's economy of matter or mind. From one logical place the particle description applies, from another place the wave description. Both descriptions are not reducible to each other, but their incompatibility cannot be thought of as a falsification of the other description either. Both and or complementarity apply. Bivalence is replaced by multivalence.

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← PREVIOUS NEXT →

META

CONTACT
FORCE-INC/MILLE PLATEAUX

IMPRESSUM
DATENSCHUTZERKLÄRUNG

TAXONOMY

CATEGORIES
TAGS
AUTHORS
ALL INPUT

SOCIAL

FACEBOOK
INSTAGRAM
TWITTER